PTO 08-7906

CC=JP
DATE=19980127
KIND=A
PN=10024750

GEARSHIFT DEVICE
[SHIFT LEVER SOCHI]

NORIYASU SHAMOTO

UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. SEPTEMBER 2008
TRANSLATED BY: SCHREIBER TRANSLATION,INC.

PUBLICATION COUNTRY	(10):	JP
DOCUMENT NUMBER	(11):	10024750
DOCUMENT KIND	(12):	A
PUBLICATION DATE	(43):	19980127
APPLICATION NUMBER	(21):	81793453
APPLICATION DATE	(22):	19960709
INTERNATIONAL CLASSIFICATION	(51):	B60K 20/04 ; F16H 59/10
PRIORITY COUNTRY	(33):	N/A
PRIORITY NUMBER	(31):	N/A
PRIORITY DATE	(32):	N/A
INVENTOR(S)	(72):	NORIYASU SHAMOTO
APPLICANT(S)	(71):	TOKAI RIKA CO., LTD.
DESIGNATED CONTRACTING STATES	(81):	N/A
TITLE	(54):	GEARSHIFT DEVICE
FOREIGN TITLE	[54A]:	SHIFT LEVER SOCHI

Claims

1. A gearshift device, comprising:

a gearshift lever, which has gearshift lever directions of the front-and-back direction of a vehicle and vehicle's width direction and is designed to be optionally shifted in any shift range;

a guiding means that protrudes in the vehicle's width direction from the gearshift lever; and

a gate groove to guide to insert said guiding means therein so that said guiding means slidably moves and is guided to optional shifting range.

2. The gearshift device, according to claim 1,

wherein said gate groove is formed on both sides of said gearshift.

3. The gearshift device according to claim 1 or 2, wherein said guiding means is comprised of an arm that protrudes from said gearshift lever in the vehicle's width direction and a pin that protrudes from an end of said arm in the perpendicular direction.

4. The gearshift device according to claim 3, wherein said arm is supported by said gearshift lever so as to slidably move.

5. The gearshift device according to claim 3 or 4, wherein the outer circumferential surface of said pin is covered with a cushion cap.

[Detailed Description of the Invention]

The present invention relates to a gearshift device used for a transmission of a vehicle.

[0002]

[Conventional Technique]

As shown in Fig. 8, a gate type gearshift device [110] that shifts an automatic transmission includes a box-like housing [114], on which a zigzag guiding groove [112] is formed. Under the housing [114], a reinforcing plate [120] is disposed via slide covers [116] and [118].

[0003]

This reinforcing plate [120] has a guiding groove [122] having substantially the same shape as that of the guiding groove [112]. The gearshift lever [126] inserted in the guiding grooves [116] and [118] is guided along the guiding groove [122] and moves in the front-and-back direction of the vehicle and the vehicle's width direction, so as to select any shifting range.

[0004]

Accordingly, since the gearshift [126] is conventionally designed to be directly guided with the

guiding groove [122], it was necessary to reduce the hitting noise of the gearshift lever [126] to the guiding groove [122] by attaching a rubber cushioning material [124] to the groove wall of the guiding groove [122] of the reinforcing plate [120] as shown in Fig. 9.

[0005]

However, a step of attaching the cushioning material [124] to the guiding groove [122] is troublesome and the cushioning material [124] may be deteriorated. As shown in Fig. 7, since the gearshift lever [126] tilts and hits the corner edge sections of the cushioning material [124] so that the contact is point contact and thereby plastic deformation is caused by the impact.

[0006]

Furthermore, as the gearshift is away from a control shaft [128] that pivotally supports the gearshift [126], width of the displacement of the gearshift [126] geometrically becomes larger, so that the guiding groove [122] has to have a certain width. For this reason, it is necessary to precisely manufacture the guiding groove [122] so as to have a certain width. However, by doing this, the manufacturing cost becomes higher.

[0007]

In addition, it has been proposed to reduce the width of the guiding groove [122] by making the reinforcing plate [120] close to the control shaft [128], but since some degree of idling is necessary depending on the diameter of the gearshift lever [126], it is difficult to change the position of the reinforcing plate [120]. Accordingly, it is impossible to make a gate type gearshift without a certain space.

[0008]

[Problems to be Solved by the Invention]

In view of the above problems, an object of the present invention is to provide a gearshift device having a gate near a shaft part of the gearshift lever without a reinforcing plate and a noise reduction mechanism.

[0009]

[Means to Solve the Problem]

In the invention according to claim 1, the gearshift lever can shift in the front-and-back direction of a vehicle and in the vehicle's width direction, and any shifting range can be selected by operating the gearshift lever.

[0010]

The guiding means protrudes in the vehicle's width direction from the gearshift lever, and the guiding means

is inserted in the gate groove, and the gearshift lever is guided to any shifting range along the guiding groove.

[0011]

As described above, since the guiding means to guide the gearshift lever is separately provided, precision for molding the gearshift lever is not required so much in comparison with a type in which the gearshift lever is directly guided to the guiding groove, and the manufacturing cost can be reduced.

[0012]

In addition, the gate groove can be made close to the shaft part of the gearshift lever, and since the shifting width of the gearshift lever at this part is small, the difference between the protrusions non-protruded parts of the gate groove may be made small.

[0013]

Therefore, the range of operating the gearshift lever at the upper end of the gearshift lever can be secured, and a highly precise gearshift can be designed to have small size.

[0014]

In the invention according to claim 2, the gate groove is formed at the both sides of the gearshift lever. For

this reason, the guiding means is stably guided in the gate groove.

[0015]

In the invention according to claim 3, the arm protrudes from the gearshift lever in the vehicle's width direction, and a pin is provided so as to protrude from the edge of the arm in the perpendicular direction (upward or downward).

[0016]

Accordingly, since the pin is inserted in the gate groove via the arm, the gate groove may be freely arranged.

[0017]

In the invention according to claim 4, the arm is pivotally supported by the gearshift lever. For this reason, even if the gearshift lever tilts, since the pin is guided in the gate groove while the arm slides, the outer circumferential surface of the pin correctly contacts with a groove wall of the gate groove by surface contact, so that it is hardly worn out.

/3

[0018]

In the invention according to claim 5, the outer circumferential surface is covered with a cushion cap. Therefore, the hitting noise generated when the pin hits

the gate groove can be reduced. In addition, since the cushion cap simply needs to be attached to the pin, a conventional step of attaching a cushioning material in the guiding groove may be omitted, and the contact with the gate groove is surface contact, the cushioning cap will be evenly worn out and exhibits higher durability.

[0019]

[Embodiment of the Invention]

As shown in Figs. 1 and 2, a gearshift device [10] of the embodiment includes a base member [12] having a rectangular frame-like shape, which is to be attached in a tunnel section provided in the center of a floor so as to protrude.

[0020]

This base member [12] includes brackets [14] and [16] which are provided perpendicularly. Each bracket [14] and [16] has a shaft hole [18], and a control shaft [20] is to be supported by the shaft holes [18]. The control shaft [20] is fitted in a pair of brackets [28] that protrude from a block [26] formed at the lower end of the gearshift lever [22]. These brackets [28] support the control shaft [20] with a pin [32] that is secured with a push nut [30] so as to be rotatable in the axial direction. A torsion spring [34] is provided between the brackets [28] and the

control shaft [20], and the torsion spring [34] pressures the gearshift lever [22] towards the driver's seat.

[0021]

Accordingly, the gearshift lever [22] pivotally moves in the front-and-back direction of a vehicle around the pin [32]. Here, the control shaft [20] is joined to an automatic transmission via a transmission mechanism, and is designed to shift the automatic transmission by operating the gearshift lever [22].

[0022]

On the other hand, a recessed section [36] is provided in the center of the gearshift lever [22], and a flat arm [38] is attached to the recessed section [36] with some degree of freedom of displacement. In addition, a through hole [40] is provided on a bottom surface of the recessed section [36], so as to be through in a direction perpendicular to an axis of the gearshift lever [22]. A pin [44] is inserted in a through hole [42] provided in the center part of the arm [38], and secured with a push nut [43]. By doing this, the arm [38] can swingably displace in the upward or downward direction around the pin [44].

[0023]

In addition, pins [46] and [48] are provided so as to protrude from the both ends of the arm [38]. Cylindrical

caps [50] are fitted to the pins [46] and [48]. The cushioning caps are formed from a soft material such as rubber, elastomer, or PP-based material, so as to secure the cushioning property. By doing this, hitting noise generated when pins [46] and [48] hit the gate groove can be reduced. In addition, since the cushioning cap [50] simply needs to be attached, a conventional step of attaching the cushioning material to the guiding groove can be omitted.

[0024]

On the other hand, a gate plate [56], on which gate grooves [52] and [54] to insert pins [46] and [48] are formed so that the pins [46] and [48] can slidably move, is arranged above the base member [12]. At the center (between the gate groove [52] and the gate groove [54]) of the gate plate [56], a long hole [58] having a rectangular shape to insert the gearshift lever [22] is formed. Then, by the pins [46] and [48] being guided by the gate grooves [52] and [54], the gearshift lever [22] moves in a zigzag way inside the long hole [58] in the front-and-back direction and left-and-right direction.

[0025]

Here, the gate groove [52] and the gate groove [54] have the same shape. While the gearshift lever [22] is

pivotally supported by the control shaft [20], the outer circumferential surface of the cushioning cap [50] is in a position to hit the gearshift lever. With this constitution, even if the gearshift lever [22] is operated and tilted in the front-and-back direction of the vehicle, the arm [42] moves like a seesaw, and the pins [46] and [48] are guided in the gate grooves [52] and [54], the outer circumferential surface of the cushioning cap [50] accurately contacts with the groove wall of the gate grooves [52] and [54] so as to make surface contact and to be hardly worn out.

[0026]

In addition, the top-view shape of the gate grooves [52] and [54] is similar to that of the guiding groove [68] formed in the housing [66], and has the groove width that is the same as the diameter of the cushioning cap [50].

[0027]

Accordingly, precision is not required for molding the gate grooves [52] and [54], and therefore the manufacturing cost can be reduced. In addition, the gate grooves [52] and [54] can be made closer to the shift section of the gearshift [22]. Since the width of the displacement of the gearshift at this portion is small, the height difference

of the gate grooves [52] and [54] can be reduced even by the displacement.

[0028]

On the other hand, a cam plate [62] is arranged on the upper surface of the gate plate [56]. One end of the cam plate [62] is pivotally supported to the gate plate [56] by a shaft [60] via a torsion spring [70]. As shown in Fig. 3, the cam plate [62] is pressured to the long hole [58], and stopped by a stopper [72] while the protrusions [62A] and [62B] protrude inside the gate groove [54].

[0029]

Furthermore, at a free end of the cam plate [62], the lever [74] protrudes in the lateral direction, and the end of the lever [74] hits a tapered surface of a wedge shaped block [80] provided at the end of a rod [78] of a holding type solenoid [76].

[0030]

When the solenoid [76] is not excited, this rod [78] is pressured by the spring not to slide being pushed by the lever [74]. As described, by having the cam plate [62] not come off from the gate groove [54], so-called “shift lock mechanism” and “R inhibit mechanism” are generated since the pin [48] cannot move from “P” range to “R” range or

cannot move from “N” range to “R” range due to protrusions [62A] and [62B].

/4

[0031]

In addition, once the solenoid [76] is excited, the rod [78] becomes slidable. When the gearshift lever [22] is moved in the lateral direction, the pin [48] pushes the protrusion [62A], and the lever [74] presses back the block [80], so that the cam plate [62] comes off from the guiding groove [54].

[0032]

On the other hand, an S-shaped leaf spring lock [84], which is bent to an S-shape, is arranged in the long hole [58]. When the gearshift lever [22] is moved to “3” range, a leaf spring lock [84] moves over the curved section so as to achieve a kind of locking function (See Fig. 7).

[0033]

In addition, on the gate groove [52] side, micro-switches [86] and [88] are arranged in positions of “P” range and “D” range. Being pressed by the pin [46], the shift range of the gearshift lever [22] is detected.

[0034]

On the other hand, a lower housing [92] having a rectangular hole [90] to insert the gearshift lever [22] is

disposed above the gearshift plate [56]. A strike plate [94] is extendedly provided along an edge of the rectangular hole [90]. A flat slide cover [96] is fitted in the strike cover [94]. A long hole [98] extending in the width direction is formed in the center of the slide cover [96]. The gearshift lever [22] is inserted in the long hole [98]. Then, the slide cover [96] moves together with the gearshift lever [22] in the front-and-back direction of a vehicle, which allows operation of the gearshift lever [22] in the vehicle's width direction. Here, a cover [102], on which a circular hole [100] to put the gearshift lever therethrough, is arranged under the slide cover [96], and shields a gap of the long hole [98].

[0035]

Furthermore, the housing [66], in which gate-like guide groove [68] to put the gearshift lever [22] therethrough is formed, is attached in the lower housing [92]. An upper edge of the gearshift lever [22] is designed to attach an operation knob [106] via a cover knob [104]. In addition, a plate, on which initial letters such as "R", "N", and "D-3" are printed according to the gearshift ranges, is mounted.

[0036]

Hereunder, operation of the gearshift device in this embodiment will be described. As shown in Figs. 3 and 4, when the gearshift lever [22] is operated to shift from "P" range to "D" range, a footbrake is first pressed so as to electrically connect the solenoid [76], the rod [78] can be pressed down with the lever [74] via the block [80].

[0037]

Here, if the gearshift lever [22] is moved toward the front passenger's seat side, being is pushed by the gearshift lever [22], the protrusion [62A] of the cam plate [62] rotates around the shaft [60] and moves away from the gate groove [54]. With this movement, the shift lock is released.

[0038]

This gearshift lever [22] is pressured to the gate groove [52] side with the torsion spring [34]. While the outer circumferential surface of the cushioning cap [50] that covers the end surfaces of the pins [46] and [48] contacts with the gate grooves [52] and [54] by their surfaces, the gearshift lever [22] is guided to any shift ranges.

[0039]

With this cushioning cap [50], hitting noise generated by hitting the gate grooves [52] and [54] is reduced. In

addition, since the cushioning cap [50] simply needs to be attached to the pins [46] and [48], a conventional step to attach a cushioning material to the guide groove may be omitted. Furthermore, since contact with the gate grooves is surface contact, the cushioning cap can be evenly worn out, and therefore the durability can be improved.

[0040]

In addition, by separately providing pins [46] and [48] to indirectly guide the gearshift lever [22], precise forming of the unevenness of the gate grooves [52] and [54] is not required, and the manufacturing cost can be reduced.

[0041]

If the gearshift lever [22] is subsequently shifted to the “3” range, the gearshift lever moves over [84] so as to achieve locking as shown in Fig. 5.

[0042]

In addition, as shown in Figs. 6 and 7, when a “R” inhibit mechanism is working, the gearshift lever cannot shift from the “N” range to the “R” range without rotating the cam plate [62].

[0043]

Here, if the solenoid [76] is electrically connected by pressing the footbrake, the rod [78] can be pressed down with the lever [74] via the block [80].

[0044]

Therefore, if the gearshift lever [22] is moved toward the front passenger seat side, being pushed by the gearshift lever [22], the protrusion [62B] of the cam plate [62] rotates around the shaft [60], and moves away from the gate groove [54]. With this movement, the gearshift lever [22] can shift leftward, and can be moved from the "N" range to the "R" range. Accordingly, by only restricting the movement of the pins [46] and [48] with the cam plate [62], the shift locking mechanism and the "R" inhibit mechanism can be easily formed.

[0045]

Here, in this embodiment, the pins [46] and [48] are provided so as to protrude downward from the arm [38], but the pins may be provided on the upper edge so as to insert the pins to the gate grooves from the downward. Alternatively, the arm 38 may not have to extend in the left-and-right direction, but it can be formed so that the pin can be guided only by one gate groove, for example, the gate groove [54].

[0046]

Furthermore, in this gearshift device, if high impact is applied on the gearshift lever [22] upon collision, the

pins [46] and [48] can absorb collision energy by the plastic deformation.

[0047]

Here, the letters that indicate the shift ranges in Figs. 3-7 are shown for easy understanding, and are actually printed on the plate [108].

[0048]

[Effects of the Invention]

Because of the above constitution, it is not necessary to use a reinforcing plate in the invention, the structure of the gearshift can be simplified and a cushioning material to reduce the hitting noise does not have to be attached in the guide groove, and the precision of the gate groove is not required by providing a gate near the shaft of the gearshift lever.

/5

[Brief Description of the Drawings]

Fig. 1 is an exploded perspective view of major portion of a gearshift device of an embodiment.

Fig. 2 is a perspective view showing relation between a gate groove and a pin of the gearshift device of an embodiment.

Fig. 3 is a top cross-sectional view of the gearshift device of the embodiment, which is viewed from the upper part of the gate plate.

Fig. 4 is a top cross-sectional view of the gearshift device of the embodiment, which is viewed from the upper part of the gate plate.

Fig. 5 is a top cross-sectional view of the gearshift device of the embodiment, which is viewed from the upper part of the gate plate.

Fig. 6 is a top cross-sectional view of the gearshift device of the embodiment, which is viewed from the upper part of the gate plate.

Fig. 7 is a top cross-sectional view of the gearshift device of the embodiment, which is viewed from the upper part of the gate plate.

Fig. 8 is an exploded perspective view of a major portion of a conventional gearshift device.

Fig. 9 is a side view of the conventional gearshift showing relation between a gearshift lever and a reinforcing plate.

[Description of Reference Numerals]

22: Gearshift lever

38: Arm (guiding means)

46: Pin (guiding means)

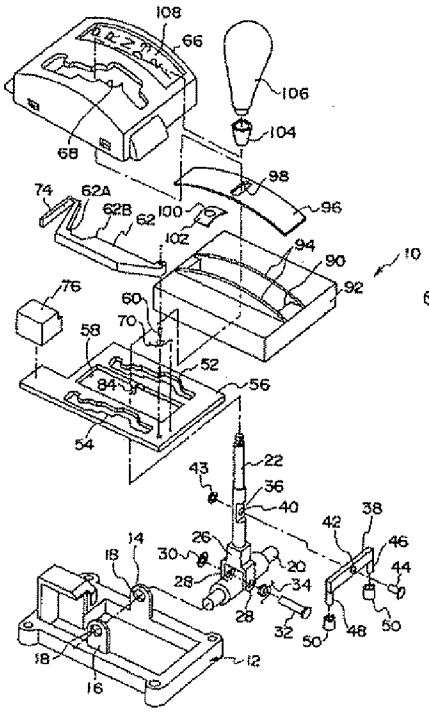
48: Pin (guiding means)

50: Cushioning cap

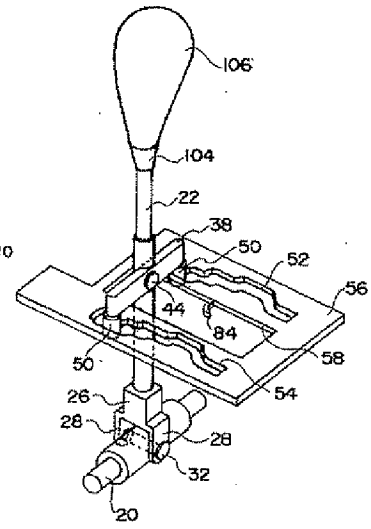
52: Gate groove

54: Gate groove

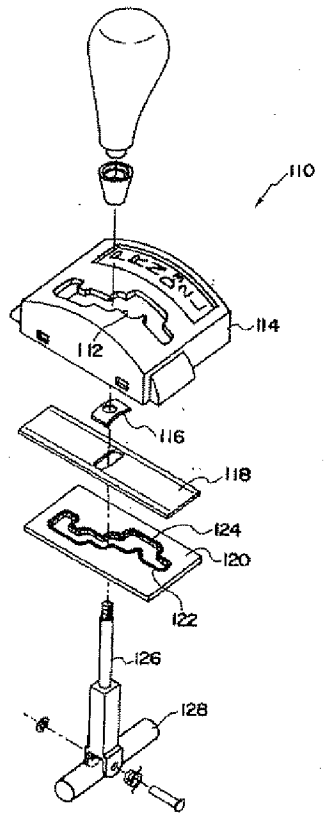
56: Gate plate



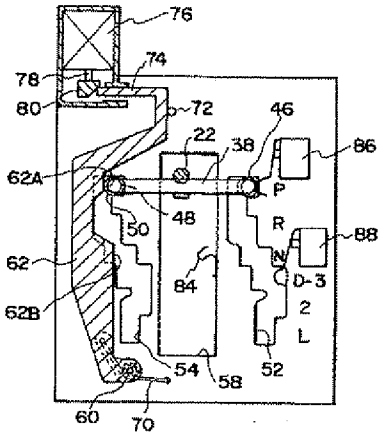
[Fig. 1]



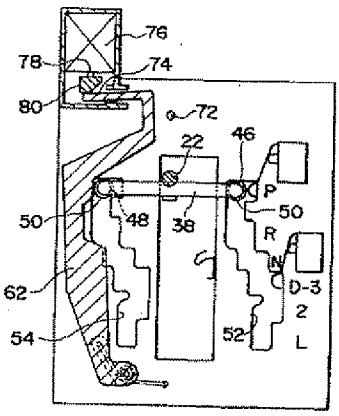
[Fig. 2]



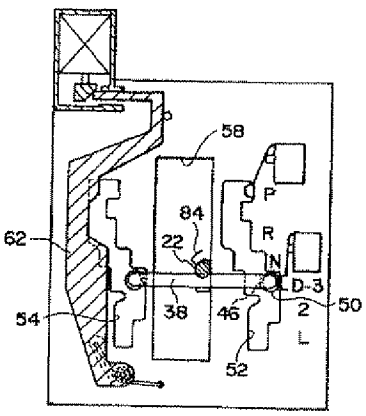
[Fig. 8]



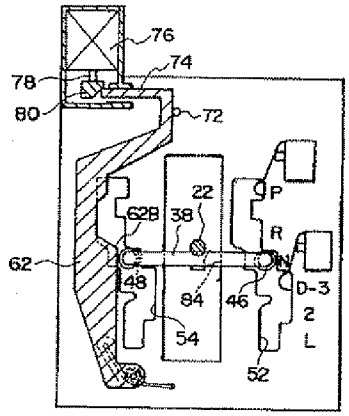
[Fig. 3]



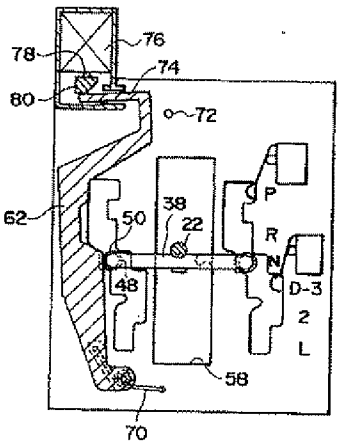
[Fig. 4]



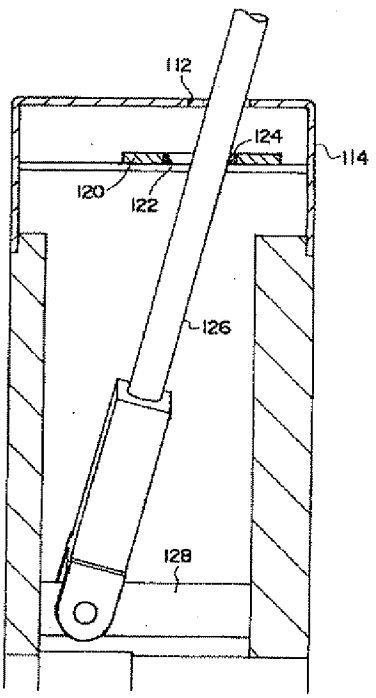
[Fig. 5]



[Fig. 6]



[Fig. 7]



[Fig. 9]